Table 2. Central Line Data Before and After Intervention

Data	Before (30 mo)	After (18 mo)	*P* Value[a]
No. of blood cultures per 1000 central line-days, median (IQR)	56 (30-86)	79 (53-110)	.08
No. of CLABSIs	11	0	<.001
No. of CLABSIs per 1000 central line-days, mean (SD)	1.2 (1.9)	0 (0)	.02
No. of CLABSIs per 1000 patient-days, mean (SD)	2.2 (3.9)	0 (0)	.01
No. of patient-days, median (IQR)	335 (287-346)	390 (343-426)	.002
No of central line-days, median (IQR)	168 (142-207)	132 (109-164)	.03
No of central line-days per 1000 patient-days, median (IQR)	0.57 (0.46-0.65)	0.34 (0.30-0.44)	.001

Abbreviations: CLABSIs, central line associated bloodstream infections; IQR, interquartile range.

[a] Determined by use of the *t* test or the Fisher exact test.

showed no significant correlation between central line-days and rate of CLABSIs (P = .95, determined by the Pearson χ^2 test).

Discussion | Burn ICUs have been plagued by higher rates of nosocomial infections and associated complications than other ICUs, and CLABSIs have been an important contributor to those rates.[4] Since the implementation of a multidisciplinary and multimodal CLABSI bundle customized to our BTICU, we have had no CLABSIs. We also have significantly reduced the number of central line-days, likely owing to the daily assessment of the need for central access, with a simultaneous increase in the total number of patient-days and no decrease in the frequency of blood cultures. We did not collect data on anatomic site of catheter insertion because our longstanding practice has been to optimize the catheter's distance from burn wound, and this did not change during the review period.[5]

Because of the multimodal nature of our intervention, we are unable to isolate a single measure that resulted in our zero CLABSI rate since September 2013. Our CLABSI bundle has been successful for our center and can be used as a foundation for other burn centers and ICUs to develop similar protocols. The implementation of a multimodal, multidisciplinary CLABSI bundle transformed a burn ICU that was performing better than national norms for CLABSI rates to one with a zero CLABSI rate.

Lois Remington, BSN
Iris Faraklas, BSN
Kristy Gauthier, BSN
Colby Carper, BSN
J. Bradley Wiggins, BSN
Giavonni M. Lewis, MD
Amalia Cochran, MD

Author Affiliations: Burn-Trauma ICU, Department of Surgery, University of Utah, Salt Lake City (Remington, Faraklas, Gauthier, Carper, Wiggins, Lewis, Cochran); Web and Social Media Editor, *JAMA Surgery* (Cochran).

Corresponding Author: Amalia Cochran, MD, Burn-Trauma ICU, Department of Surgery, University of Utah, 30 N 1900 E, Salt Lake City, UT 84132 (amalia.cochran@hsc.utah.edu).

Published Online: December 23, 2015. doi:10.1001/jamasurg.2015.4445.

Author Contributions: Ms Faraklas and Dr Cochran had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Remington, Faraklas, Gauthier, Carper, Wiggins, Cochran.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Remington, Faraklas, Gauthier, Wiggins, Lewis, Cochran.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Remington, Faraklas.
Administrative, technical, or material support: All authors.
Study supervision: Remington, Wiggins, Cochran.

Conflict of Interest Disclosures: None reported.

Disclaimer: Dr Cochran is the Web and Social Media Editor for *JAMA Surgery* but was not involved in the editorial review or decision to accept the manuscript for publication.

Previous Presentation: This paper was presented at the 47th Annual Meeting of the American Burn Association; April 23, 2015; Chicago, Illinois.

1. Weaver SJ, Weeks K, Pham JC, Pronovost PJ. On the CUSP: stop BSI: evaluating the relationship between central line-associated bloodstream infection rate and patient safety climate profile. *Am J Infect Control*. 2014;42(10 suppl):S203-S208.

2. Pronovost P, Needham D, Berenholtz S, et al. An intervention to decrease catheter-related bloodstream infections in the ICU. *N Engl J Med*. 2006;355(26):2725-2732.

3. Centers for Disease Control and Prevention (CDC). Bloodstream infection event (central line–associated bloodstream infection and non–central line–associated bloodstream infection). http://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf Modified April 2015. Accessed August 4, 2015.

4. Dudeck MA, Edwards JR, Allen-Bridson K, et al. National Healthcare Safety Network report, data summary for 2013, Device-associated Module. *Am J Infect Control*. 2015;43(3):206-221.

5. Franceschi D, Gerding RL, Phillips G, Fratianne RB. Risk factors associated with intravascular catheter infections in burned patients: a prospective, randomized study. *J Trauma*. 1989;29(6):811-816.

ASSOCIATION OF VA SURGEONS

Analysis of Cases in Which a Biopsy Specimen Is Positive and an Excised Lesion Is Negative for Nonmelanoma Skin Cancer

Nonmelanoma skin cancers (NMSCs), including squamous cell carcinoma (SCC) and basal cell carcinoma (BCC), are the most common types of cancer with the fastest-growing treatment costs in the United States.[1] Standard treatment requires biopsy for histologic confirmation, followed by excision. Oftentimes, no residual carcinoma is detected, implying spontaneous clearance at rates reported to vary from 24% to 76%.[2-5] These types of lesions have been investigated by others[2-5] and are not fully understood. Our study aims to determine the lesion and patient characteristics that would most strongly predict a histologically negative result for an excised lesion after a biopsy specimen had positive margins.

Methods | Our retrospective database study was approved by the institutional review board of the Richard L. Roudebush Veterans Affairs Medical Center in Indianapolis, Indiana; informed consent was not obtained because the data were deidentified. Our study was conducted using the *International*

Table. Data on Spontaneous Clearance of Residual Carcinoma by Histology in Biopsied NMSCs for Studied Variables Subdivided by SCC and BCC in Bivariate Analysis[a]

	Overall		SCC		BCC	
Parameter	OR	*P* Value	OR	*P* Value	OR	*P* Value
Cancer type (SCC vs BCC)	3.4352	<.001				
Scar in excision pathology report	10.8932	<.001	13.9621	<.001	8.1125	<.001
Ulcer in excision pathology report	0.5054	<.001	0.3385	<.001	0.5958	.05
Scar in pre-excision clinic report	2.2917	<.001	4.6142	<.001	1.8621	.003
Location (head/neck vs trunk/limb)	0.5498	<.001	0.4986	<.001	...	.98
Ulcer in biopsy clinic/pathology report	0.6004	<.001	0.5555	.002	...	.34
Original size of lesion	0.9460	<.001	0.9390	<.001	0.8850	<.001
Biopsy specimen size	1.0410	<.001	...	.30	...	.10
Biopsy type (punch vs shave)	0.5257	.01	0.3503	.01	...	.18
Size of excised lesion	0.9900	.01	0.9790	.003	0.9780	.004
No. of days between biopsy and excision	0.9980	.05	...	.90	...	.07
Nicotine use	0.9960	.05	...	.06	0.9920	.03
Immunosuppression	...	.26	...	.49	...	.84
Vietnam service	...	.34	...	.56	...	.67
Age	...	.45	...	.13	...	.53
Diabetes	...	.80	...	.85	...	.65
Agent Orange exposure	...	.82	...	.434	...	.44

Abbreviations: BCC, basal cell carcinoma; NMSCs, nonmelanoma skin cancers; OR, odds ratio; SCC, squamous cell carcinoma.

[a] Odds ratios were not provided for variables that were not statistically significant to *P* = .05 (and some variables lost significance when analyzed within the subcategory of cancer type SCC or BCC).

Classification of Diseases, Ninth Revision codes for NMSCs and the *Current Procedural Terminology* codes for both biopsy and excision of lesions treated at the Richard L. Roudebush Veterans Affairs Medical Center during the period from 2003 to 2013. Data were collected for primary NMSCs that had a positive-margin biopsy followed by lesion excision. Lesions that underwent concurrent dermatologic treatment were excluded from our study. Patients with more than 20 lesions in a lifetime were also excluded. Bivariate analysis was performed to identify the parameters that significantly contributed to the negative results regarding the excised lesions. Analysis was performed using SAS (SAS Institute Inc). *P* = .05 was considered statistically significant.

Results | The inclusion and exclusion criteria described in the Methods section yielded a total of 1867 lesions from 1299 patients who were mostly white (92%), male (99%), and between the ages of 50 and 90 years (97%) (mean age, 72 years). The rate of excised lesions that tested negative was 58% in cases of SCC and 23% in cases of BCC. Parameters significantly associated with negative results after excision were type of cancer (SCC or BCC), histologic appearance of scar or ulcer after excision, clinical appearance of scar after biopsy but before excision, prebiopsy ulceration, type of biopsy (punch or shave), and simplified anatomic site (head and neck or trunk and limb). Their *P* values and odds ratios are listed in the **Table**. Odds ratios for lesions subdivided by SCC and BCC are also listed. Clinically important associations included the histologic finding of a scar after excision, clinical appearance of a scar after biopsy but before excision, histologic ulceration on the excised lesion, clinical or histologic ulceration on the biopsy specimen, and location in the head and neck.

Discussion | Our study included data collected from a very large Veterans Affairs Medical Center data set; variables not likely to be important with regard to excised lesions that were negative for residual cancer include age, diabetes, immunosuppression, Vietnam service, Agent Orange exposure, nicotine use, and number of days between biopsy and excision. The most significant pre-excisional factor was NMSC type, for which cases of SCC had a higher rate of excised lesions that were negative than did cases of BCC. The literature suggests that the biopsy-induced wound-healing process is a major cause of these negative findings after excision[4-6] and is consistent with the results of our study. The clinical appearance of just a scar was predictive, with odds ratios for a negative finding after excision of 4.6 for cases of SCC and 1.9 for cases of BCC. Historically, the mean (SD) recurrence rate for surgical excision with a 4-mm margin has been reported at 1.6% (1.8%).[7]

The 2 major limitations of our study are its veteran population (mostly white male patients), which limits generalization to all populations, and our inability to verify total lack of NMSC in excision specimens via pathology. Although lesions are "breadloafed," not every part of the section is viewed. A logistic regression analysis would help identify additional relationships, as well as confounders, among the variables and may be useful in creating a prediction model for negative findings after excision that can be used to make cost-cutting decisions in the clinic. Such a model would allow patients with a high likelihood of a negative finding after excision and with a limited lifespan to be treated conservatively because the chance of the NMSC causing significant morbidity would be minimal. Currently, no long-term outcome data exist, and so further studies are being conducted. Patients with a high probability of negative findings after excision are randomly assigned to 1 of 2 different treat-

ment groups: conservative therapy or surgical excision. The patients would then be closely monitored yearly for recurrence to determine the utility of prediction and of conservative therapy.

Jane Han, BS
Naveed N. Nosrati, MD
Tahereh Soleimani, MD, MPH
Imtiaz A. Munshi, MD
Roberto L. Flores, MD
Sunil S. Tholpady, MD, PhD

Author Affiliations: Division of Plastic Surgery, Department of Surgery, Indiana University, Indianapolis (Han, Nosrati, Soleimani); Indiana University School of Medicine, Indianapolis (Han); Department of Surgery, Richard L. Roudebush Veterans Affairs Medical Center, Indianapolis, Indiana (Munshi, Tholpady); Department of Plastic Surgery, New York University, New York (Flores).

Corresponding Author: Sunil S. Tholpady, MD, PhD, Department of Surgery, Richard L. Roudebush Veterans Affairs Medical Center, 705 Riley Hospital Dr, RI 2514, Indianapolis, IN 46202 (stholpad@iupui.edu).

Published Online: December 30, 2015. doi:10.1001/jamasurg.2015.4449.

Author Contributions: Drs Tholpady and Nosrati had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Han, Nosrati, Flores, Tholpady.
Acquisition, analysis, or interpretation of data: Han, Nosrati, Soleimani, Munshi, Tholpady.
Drafting of the manuscript: Han, Nosrati, Soleimani, Tholpady.
Critical revision of the manuscript for important intellectual content: Han, Nosrati, Munshi, Flores, Tholpady.
Statistical analysis: Han, Soleimani, Tholpady.
Administrative, technical, or material support: Munshi, Flores, Tholpady.
Study supervision: Munshi, Tholpady.

Conflict of Interest Disclosures: None reported.

Previous Presentation: This paper was presented at the 39th Annual Meeting of the Association of VA Surgeons; May 3, 2015; Miami Beach, Florida.

1. Guy GP Jr, Machlin SR, Ekwueme DU, Yabroff KR. Prevalence and costs of skin cancer treatment in the U.S., 2002-2006 and 2007-2011. *Am J Prev Med*. 2015;48(2):183-187.

2. Stewart CM, Garlick J, Mcmullin J, et al. Surgical Excision of non-melanoma skin cancer in an elderly Veteran's Affairs population. *Plast Reconstr Surg Glob Open*. 2014;2(12):e277.

3. Zemelman V, Silva P, Sazunic I. Basal cell carcinoma: analysis of regression after incomplete excision. *Clin Exp Dermatol*. 2009;34(7):e425.

4. Swetter SM, Boldrick JC, Pierre P, Wong P, Egbert BM. Effects of biopsy-induced wound healing on residual basal cell and squamous cell carcinomas: rate of tumor regression in excisional specimens. *J Cutan Pathol*. 2003;30(2):139-146.

5. Goldwyn RM, Kasdon EJ. The "disappearance" of residual basal cell carcinoma of the skin. *Ann Plast Surg*. 1978;1(3):286-289.

6. Dellon AL, DeSilva S, Connolly M, Ross A. Prediction of recurrence in incompletely excised basal cell carcinoma. *Plast Reconstr Surg*. 1985;75(6):860-871.

7. Gulleth Y, Goldberg N, Silverman RP, Gastman BR. What is the best surgical margin for a Basal cell carcinoma: a meta-analysis of the literature. *Plast Reconstr Surg*. 2010;126(4):1222-1231.

Barriers to Participation in Preoperative Risk-Reduction Programs Prior to Ventral Hernia Repair: An Assessment of Underserved Patients at a Safety-Net Hospital

Nearly 80% of patients presenting with a ventral hernia have modifiable risk factors such as obesity, poor fitness, smoking, and poorly controlled diabetes mellitus.[1] Preoperative risk-reduction programs have been shown to be effective in behavior modification. However, generalizability of these outcomes to underserved patients may be hindered by unrecognized barriers.[2] The aim of this study was to identify patient-reported barriers to successful implementation of a preoperative risk-reduction program at a safety-net hospital.

Methods | This was a prospective, qualitative study of patients evaluated at an outpatient hernia clinic at Lyndon B. Johnson General Hospital, Houston, Texas. The study was initiated concurrently with the development of a preoperative risk-reduction program.[3] Interviews were conducted to investigate patient perspectives of their current health status, desire for risk modification, and barriers to participation. Sampling was continued until thematic saturation was achieved. Responses were correlated with clinical data. National guidelines were used to define standards for obesity and quality of diabetic control.[4]

This study was approved by the institutional review board of the Harris Health System (HSC-MS-14-1025). Oral consent was obtained from all study participants.

Table 1. Comorbidities of 43 Patients

Variable	No. (%)		
	Self-reported	Actual	Incorrect Self-assessment[a]
Overweight	33 (76.7)	40 (93.0)	7 (16.3)
BMI, 25-29.9	NA	8 (18.6)	3 (7.0)
BMI ≥30	NA	32 (74.4)	4 (9.3)
Current smoker	8 (18.6)	NA	NA
Poor fitness	16 (38.1)	10 Repetitions (9-16)[b]	6 (14.0)
Diabetes or prediabetes	14 (32.6)	23 (53.5)	9 (20.9)
HbA_{1C} , 5.7%-6.4%[c]	5 (11.6)	14 (32.6)	9 (20.9)
HbA_{1C} >6.5%[c]	9 (20.9)	9 (20.9)	0 (0)

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); HbA_{1c}, glycated hemoglobin; NA, not applicable.

SI conversion factor: To convert HbA_{1C} to proportion of total hemoglobin, multiply by 0.01.

[a] All incorrect self-assessments were underestimates (ie, not overweight, no diabetes, or fit).

[b] Median repetitions (range) in the sit and stand test. The sit and stand test is a standardized test of fitness and endorsed by the Centers for Disease Control and Prevention. The minimum expected threshold is 14 repetitions for men and 12 repetitions for women older than 60 years. Standards have not been established for those younger than 60 years.[5]

[c] Definitions of prediabetes (5.7%-6.4%) and diabetes (≥6.5%).